No. 10

EVOLUTION.

THE SUBSTANCE OF TWO LECTURES

BY

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EVOLUTION.

The question of Evolution belongs properly to the domain of natural science, and if discussed at all fairly must be discussed as a question of science. As it is known to many of you that some of the best years of my life were devoted to studying and teaching natural science in one of the oldest institutions of learning in our Southern Country, you will not think it presumptuous in me to attempt to discuss Evolution as a question of science.

Our world—using the word in its comprehensive sense as including plants and animals, as well as inorganic nature—is a changing world, subject to variations of many kinds and in many ways. It is with these variations that Evolution concerns itself. And to an examination of their exact nature, and the laws which govern them, in so far as those laws have been ascertained, I will first ask your attention.

I.—CHANGES IN INORGANIC NATURE.

Our world—using the word in its narrower sense as excluding plants and animals—is all the time undergoing change in some part or other; through the agency of heat and frost, storms of wind and rain, river currents and floods, volcanoes and earthquakes, gradual elevations or depressions of large districts of country, and the operation of coral polyps in building up reefs, and stone-boring mollusks in tearing these reefs to pieces again. And judging from appearances, as well as by reasoning upon the nature of the agencies themselves, this class of changes must have been greater and far more extensive in ages past than in our day. By volcanic and earthquake agency, a little more than a year ago, mountains were thrown up and a large district of level country sunk in the ocean in the neighborhood of the Island of Sumatra. On our own coast, at Nag's Head, the winds have piled up the sand hill, from which the place takes its name, where was an inlet from the ocean to the sound less than a century ago. There are instances of this class of changes of recent occurrence. The only general truth or law respecting them demanding our attention is that from the very nature of the agencies by which they are effected these changes must be confined to inorganic nature. It is the world, in the narrower sense of the word, alone which can be directly affected by them.

The series of changes of this kind which our world is believed to have undergone, whilst they constitute a development of that world, an evolution in the etymological sense of the word, and in the sense in which it was formerly used; and even now are sometimes spoken of as Cosmic Evolution, they have nothing to do with evolution, as that term is ordinarily used by scientific writers in our day, they are not embraced in the evolution I propose to discuss at the present time.

II.—CHANGES WHICH CONSTITUTE GROWTH.

By a series of changes, variations, the acorn developes into an oak, the egg into a full-grown fowl. The mature being—the oak—is very unlike the organism from which it sprung; and yet, no one who has watched this growth-development can doubt for a moment the identity of the oak with the acorn. In some instances the variations constituting growth-development are very great and very remarkable, e. g.: The silk worm (*Bombyx mori*) appears at first as a small oval egg. This hatches, as we say; and instead of the egg we have a naked green caterpillar with the regular perpendicular insect mouth, and feeding upon leaves. When this caterpillar has attained its growth it fashions for itself a curious case called a cocoon, and enclosing itself therein is transformed into a chrysalis. And then, after remaining for a season in a dormant state, it comes forth a winged moth; with the structure of its mouth so changed that it can not feed upon leaves as it once did, but must have liquid food, such as honey; and furnished with perfect wings, its companionship is no longer with worms, but with birds of the air. No less remarkable are the variations in the growth-development of the frog (*Rana*). It is first known to us as an egg. This hatches into a tadpole, an animal destitute of limbs. propelling itself through the water and breathing through gills, as fishes do. After a season its gills disappear, its tail sloughs off, articulate limbs grow and it becomes an animal living in the air, and incapable of living in the water as it once did.

In the case of man the variation is not so great as in the cases just cited; yet, in the earlier stages of his growth-development, in his embryonic condition, he presents successively forms in which an active imagination can discover some resemblance to the fish, the reptile and the mammalian quadruped; and even after his birth, when he first essays locomotion, it is usually after the manner of a quadruped.

It has sometimes been said that at the starting point of their existence all plants and animals are alike. As a late writer puts it, "the apple which fell in Newton's garden, Newton's dog Diamond and Newton himself began life at the same point" This is true in a very limited sense only. The bodies of the apple, the dog and the man are all cellular structures; and in every aggregation of cellules there must be a first cellule around which the aggregation takes

place; and it may be, and in fact is true, that with our best microscopes we have not yet been able to discover any structural difference in these first cellules of the apple, dog and man. But the fact that the apple-cellule always developes into an apple, the dog cellule into a dog, and the man-cellule into a man furnishes irrefragable proof that there is a radical difference in these cellules, either in structure or in the nature of the vitality with which they are endowed, though our microscopes may not be able to discover it.

This whole class of changes takes place under the law of variation of growth-development. Co-ordinate with this law we find another law limiting the range of these variations.

In the case of the acorn, under the law of variation, it developes into the mature oak, and there the operation of this law as a law of life ceases. The oak dies, and by chemical agencies is resolved into its original elements. Its material falls back from its condition of organic matter to that of inorganic matter again. But before its death the mature oak has produced its acorns, and from these acorns other oaks grow just as the first oak did; and so this whole series of changes is repeated time after time. The life-story of the silk-worm, the frog and man in this particular is the same with that of the oak.

The law of limitation in the case of growth-development may be thus stated: *Variation, extreme as it may be, never extends beyond the life of the individual plant or animal in which it occurs.* Growth-development runs a certain definite round and then we are brought back to the same starting point again. By growth-development an oak will never become anything but an oak to the end of time. So with the silk-worm, the frog and man.

I ask you to notice this conclusion at which we have arrived, as many writers, ignoring this law of limitation, a law as fixed and well determined as the law of variation is, appeal to these variations of growth-development in support of Evolution, a hypothesis which postulates—as we shall see—the transformation of an oak—not immediately, but by successive variations—into a silk-worm, a silk-worm into a frog and a frog into a man. Growth-development moves in a circle and has well been styled as to its variations, a system of revolution, not evolution.

III.—CHANGES WHICH LAST BEYOND THE LIFE OF THE INDIVIDUAL.

There is a large class of variations in plants and animals which accompany change of climate, domestication and cultivation, which under the operation of the "law of heredity" are often perpetuated beyond the limits of a single life.

As an instance of variation through change of climate take the case of our Indian corn (*Zea Maize*). In Virginia it grows to the

average height of ten feet and requires five or six months to mature its grain. When acclimated in Vermont or Canada it grows to but half the height and matures its grain in half the time required in Virginia. So the sweet potato (*Convolvulus Botatas*). which in its native South blooms freely. producing regular seed, by which it can be propogated as well as by its tubers, has been acclimated as far north as New Jersey; but there it never blooms and has to be propogated by its tubers alone.

Domestication and cultivation have wrought such great changes in many plants that it is with difficulty we recognize the wild stock in the improved variety, e. g: the crab-apple in the Albemarle Pippin, the dog-rose in the cloth of gold. As the result of domestication and careful breeding in the case of the horse, we have the Flemish dray horse and the Shetland pony; in the case of the dog the St. Bernard and the Sky Terrier.

Variations of this kind. as they appear in our "highly improved varieties," have usually been effected little by little. A slight improvement is wrought in one generation and perpetuated by the law of heredity. it serves as the starting point for further improvement in the succeeding generation; and so the highly improved variety secured by continued cultivation or breeding will present an accumulation of many variations, each inconsiderable in itself, but in the aggregate constituting a great change.

The capacity for variation in this way, whilst very great in some species of plants and animals, e. g.: those which man has usually carried with him in his migrations, in others seems to be almost entirely wanting. The Kentucky blue-grass has peen carefully cultivated for many years with no appreciable change. The elephant has been domesticated in the East for many centuries, and yet, naturalists tell us, no improved variety of the elephant has been secured.

Such is the law of variation governing this class of changes; changes which by the law of heredity are perpetuated beyond the limits of a single life. Are there any laws of limitation here as in the case of variations of growth-development? I answer yes.

1. *Co-ordinate with the law of heredity tending to the perpetuation of varieties once secured, is the law of degeneration through neglect or "the law of reversion to type," as it is more frequently called.* All skillful stock raisers know that any highly improved variety can be maintained only by the greatest care and the most particular attention to certain rules of breeding, which experience has taught them.

Professor Drummond writes: "If we neglect a garden plant, then a natural principle of deterioration comes in and changes it into a worse plant. Or, if we neglect almost any of the domestic animals they will rapidly revert to wild and worthless forms again. If a man neglects himself for a few years he will deteriorate into a wild and bestial savage, like the de-humanized men who are discov-

ered sometimes upon desert islands. The law of reversion to type runs through all creation." (Natural law in the Spiritual World, page 99.)

2. *Co ordinate with the law of variation we have been considering is a law of limitation confining these variations within the boundary lines of species. "the law of the permanence of species," as it is commonly called.* No two flowers have varied under cultivation more widely than the rose and pelargonium; yet the rose has always continued a rose, and the pelargonium a pelargonium. No two domestic animals have undergone greater changes by careful breeding than the horse and the dog; yet the horse has always continued a horse and the dog a dog.

The question respecting the permanence of species is not now a new question in the scientific world. On the contrary, it is a question which has engaged the attention of naturalists from a very early date. And I will add, it has been more carefully examined and more thoroughly discussed than any other question in the whole range of natural science. Three times in the course of the present century has it been under discussion. In the early part of the century, in connection with the introduction of the natural system of classification in Natural History; later on, in connection with the question of the unity of the human race, as that question was involved in the slavery controversy; and still more recently in connection with the subject we are now examining, Evolution.

The most thorough and complete examination of the question I have seen is that of Dr. Bachman, Professor of Natural History in the College of Charleston, S. C., and published in his "Unity of the Human Race;" and it may be of interest to some of you to know that Dr. Bachman was engaged in his examinations at the same time that Darwin was preparing his "Origin of Species." As exhibiting the thoroughness of Dr. Bachman's examination, he tells us: "A visit to Europe afforded us an opportunity of carrying with us American specimens of plants, birds and quadrupeds of all species, either identical with or closely allied to those of the Eastern Continent. The cabinets of individuals, the public museums and the zoological collections of living animals were freely opened to us, and the best naturalists of Europe and the world united with us for many months in patient, minute and varied examinations and comparisons. These were conducted in London, Edinburg. Berlin, Dresden and at the Association of European Naturalists that met in Germany." (Unity of the Human Race, page 11.) The result of this protracted and careful study on the mind of Dr. Bachman was a firm conviction that all natural species of plants and animals are permanent—that vary widely as they may, the variation never passes the boundary line of natural species.

I shall not attempt to give you even a brief synopsis of this discussion here—time forbids—but instead thereof I will ask your at-

tention to the recently expressed conclusions of three of the most eminent scientists of our day, who are entitled, if any are, to express an opinion on the subject.

Professor Huxley, of England, writes: "After much consideration, and assuredly with no bias against Mr. Darwin's views, it is our clear conviction that, as the evidence now stands, it is not absolutely proven that a group of animals having all the characters exhibited by species in nature has ever been originated by selection, whether artificial or natural." (*Lay Sermons, p.* 295.)

Professor De Quarterfrages, of France, writes: "I might here accumulate a mass of analogous facts and details. But over them all would appear a great general fact including them, which is the expression of a law; and here is the fact. Notwithstanding observations reaching back for thousands of years and made on hundreds of species, we do not yet know a single example of intermediate species obtained by the crossing of animals belonging to different species." (*Natural History of Man, p.* 25.)

Professor Agassiz, of our own country, writes: "Breeds (*i. e.*, varieties) among animals are the work of man; species were created by God." (*Methods of Study in Natural History, p.* 147.)

Even Darwin virtually concedes the permanence of natural species when he writes: "I doubt whether any case of a perfectly fertile hybrid animal can be considered as thoroughly well authenticated." (Origin of Species, p. 238.)

The difficulty of settling beyond all controversy the question under consideration arises mainly from two sources, viz:

(1.) The confounding of artificial and natural species. The law concerns natural species alone. Artificial species, erected by naturalists for convenience of classification, are not always coterminous with natural species, e. g.: Some naturalists make four artificial species of the one natural species of dog; and (2) the fact that the boundary line of many comparatively unknown natural species of plants and animals has as yet been but provisionally determined. But if the judgment in matters of fact of such men as Huxley and De Quarterfrages and Agassiz is to be trusted, and science is to embody facts and not fancies, I think it may be fairly claimed that in the present state of our knowledge we must consider the law of the permanence of natural species an established law, and in all our reasoning treat it as such.

Bearing in mind these several classes of variations, and the ascertained laws whch govern them, we are prepared now to consider the question—

WHAT IS EVOLUTION?

I answer—in its widest range and as held by a few only, it has been defined—"*The transformation by successive differentiations of the homogeneous into the heterogeneous.*"

In the words of Principal Dawson it is a hypothesis "which solves the question of human origin by assuming that human nature exists potentially in mere inorganic matter, and that a chain of spontaneous derivation connects incandescent molecules or star dust with the world and with man himself." (The Earth and Man, pp. 316–317.)

On the hypothesis in this form listen to what Professor Tyndall says: "The question concerning the origin of life is, whether it is due to a certain fiat, 'Let life be,' or to a process of evolution. Was it potentially in matter from the beginning, or, was it inserted at a later period? However the conviction here or there may be influenced, the process must be slow which commends this hypothesis of natural evolution to the public mind. For what are the core and essence of this hypothesis? Strip it naked and you stand face to face with the notion that not alone the more ignoble forms of animalcular or animal life, not alone the nobler forms of horse and lion, not alone the wonderful and exquisite mechanism of the human body, but that the human mind itself—emotion, intellect, will and all their phenomena—were once latent in a fiery cloud. Surely, the mere statement of such a notion is more than a refutation. I do not think that any holder of this evolution hypothesis would say that I overstate it or overstrain it in any way. I merely strip it of all vagueness and bring before you unclothed and unvarnished the notion by which it must stand or fall. Surely, these notions represent an absurdity too monstrous to be entertained by any sane mind." (*London Atheneum, as quoted in Hodge's Theology, vol. II., pp.* 8–9.)

Why is it that Professor Tyndall—and in this the great body of scientists agree with him—reject evolution in this form so emphatically? I answer, because it is irreconcilable with a settled law of biology or the science of life.

For a long time two opposite theories respecting the origin of life found currency among scientists: One, that matter can of itself generate life; the other, that life can come only from pre-existing life. This subject, often discussed before, in the last few years has been carefully re-examined by some of our most eminent scientific experimenters, in connection with the discussion of evolution in part, but more especially in connection with the more practical question of the nature and propogation of certain diseases in plants and animals, e. g.: the diseases which a few years ago attacked the vine and the silk-worm in France and for a time threatened their destruction.

The result of this careful re-examination is stated by Professor Drummond in the words: "A decided and authoritative conclusion has now taken place in science. So far as science can settle anything, this question is settled. The attempt to get the living out of the dead has failed. Spontaneous generation has to be given up. And it is now recognized on every hand that life can come only from the touch of life." [*Natural Law in the Spiritual World, p.* 63.]

And in support of this declaration he quotes:

Tyndall.—"I affirm that no shred of trustworthy experimental testimony exists to prove that life in our day has ever appeared independently of antecedent life."

Huxley.—"The present state of knowledge furnishes us with no link between the living and the non-living."

Virchow.—"Whoever recalls to mind the lamentable failure of all the attempts made very recently to discover a decided support for the *generatio æquivoca* in the lower forms of transition from the inorganic to the organic world, will feel it doubly serious to demand that this theory, so utterly discredited, should be in any way accepted as the basis of all our views of life."

"All really scientific experience tells us that life can be produced from a living antecedent only."

On such ground as this true science demands that if we adopt the hypothesis of evolution at all, its work must begin with the appearance of life in the world—it can never bridge over the gulf which separates the dead from the living

Darwin expressly excludes the inorganic world from the range of evolution by the terms of his definition, which is, "*descent with modification;* and *descent,* in the sense in which he uses the word, is "A proceeding from a progenitor, birth," (*Webster*), and so implies the previous existence of life.

Starting with primordial living beings, three or four at the most, possibly only one, whose origin he does not attempt to account for, he derives all other living beings, plants and animals therefrom by evolution. To state his doctrine in his own words. "Man is descended from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits and an inhabitant of the Old World This creature, if its whole structure had been examined by a naturalist, would have been classed amongst the quadrumana, as surely as would the common and more ancient of the New World monkeys. The quadrumana and all the higher mammals are probably derived from an ancient marsupial animal,"—the marsupial most common in Virginia is the Opossum, [*Didelphis*]—"and this through a long line of diversified forms, either from some reptile-like or some amphibian-like creature, and this again from some fish-like animal. In the dim obscurity of the past we can see that the progenitor of all the vertebrates must have been an aquatic animal, provided with branchiæ," gills, "with the two sexes united in the same individual, and with the most important organs of the body, such as the brain and heart, imperfectly developed. This animal seems to have been more like the larvæ of our existing Ascidians, 'sea squirts, as they are commonly called,' than any other known form." [*Descent of Man, vol II., p.* 372.]

As Darwin limits the range of evolution in one direction by excluding inorganic nature—all that precedes the existence of life in

the world; so others, of eminent attainments in science, limit its range in the opposite direction and exclude the origin of man from its phenomena.

Professor De Quartrefages, at the close of a lengthened discussion of the subject, writes: "To sum up, the theory that man is descended from the monkey by means of successive modifications is a brilliant fancy which has no support in precise facts; in most cases it depends upon possibilities, and often upon possibilities in flagrant opposition to facts. In the name of scientific truth I affirm that we have had for ancestors neither gorilla, nor ourang-outang, nor chimpanzee." [*Nat. His. of Man, pp.* 86–87.]

Principal Dawson writes—Evolution "cheats us with the semblance of a man without the reality. Shave and paint your ape as you may, clothe him and set him upon his feet, still he fails greatly of the 'human form divine'; and so it is with him morally and spiritually as well. We have seen that he wants the instinct of immortality, the love of God, the mental and spiritual power of exercising dominion over the earth." (*The Earth and Man. p.* 395.) Such naturalists as Virchow of Germany, Wallace of England, and Dana of our own country unite with DeQuartrefages and Dawson, in rejecting the hypothesis of evolution as applied to man.

The possession of intellect and conscience, the capacity for distinguishing between truth and error, right and wrong, the ability to communicate thought by language, the capacity to originate the fine arts, painting, sculpture, architecture, and to start and carry forward all that is embraced in our modern civilization, to say nothing of anatomical differences, make between the ape and man, not as wide a gulf, it may be, as that which separates between dead and living matter, but one as utterly impassable.

Taking the evolution hypothesis now, with these limitations,—*beginning the series with Darwin's primordial living beings, and excluding man from its range.*,—and it is with these limitations it is generally held where it is held at all,—*may we accept it, on scientific grounds, as probably true?*

I put the question in this form, because evolution is, to use the words of Prof. Huxley,—"as yet a hypothesis, and not the theory of species:" (Lay Sermons p. 295.) And a hypothesis is merely "a provisional explanation of phenomena," and therefore to be held ready to be given up, whenever a more satisfactory explanation is offered; and should never be accounted an integrant part of science itself. True science is made up of a statement of facts, and of conclusions reached by reasoning upon these facts:—And hence, in the history of science, whilst hypotheses innumerable have arisen, been popular for a season, and then passed away and been forgotten, true science has remained unchanged.

Huxley rests the claim of evolution to acceptance, mainly upon the gradual advance in the type of living beings, as we learn the

history of organic nature, from an examination of the fossiliferous rock-strata of the earth;—and the satisfactory explanation which it gives of the natural grouping of plants and animals, as set forth in the natural system of classification, now universally adopted by botanists and zoologists.

Darwin, in addition to this, urges certain facts respecting the geographical distribution of plants and animals.—the variations which animals undergo in the earlier stages of their existence, as they present themselves in our study of embryology,—and the existence of rudimentary organs in certain animals, all which he contends. are better and more fully explained by the hypothesis of evolution, than in any other way.

Before entering upon a particular examination of these several points, I would remind you, that there is another hypothesis,—we will call it a hypothesis for the present—covering the same ground with that of evolution, which was at one time universally adopted, and even now is held by men of no mean attainments in science, e. g. Agassiz and Prin. Dawson.—viz: the hypothesis of creation,—Creation by an almighty, intelligent being, working according to a plan, and with a definite end in view. And I will ask you. especially to notice two particulars, in this hypothesis. as it is presented in the oldest cosmogony extant. a cosmogony which has moulded the thoughts on this subject of many generations.

(1) Creation is not a single act of the Almighty, by which our world, embracing organic as well as inorganic nature, was brought into being, but a continuous work, or succession of acts. extending over a long period,—Geology alone can determine how long, but terminating with the creation of man:—and—

(2) In the creation of plants and animals, they were not brought into being as single individuals, or pairs at most, as evolution demands; but when the Creator spake he said—'Let the waters bring forth abundantly, (*literally, swarm forth,*) the moving creature that hath life, and fowls that may fly above the earth, in the open firmament of heaven." (*Gen.* 1: 20.) The result of such a work of creation was at once to people the air, the earth and the sea with many individuals or pairs of every species intended to in habit them,—Man, the species *Homo,* being the only exception to this general rule.

Turning now to the examination of the several arguments by which evolution is urged upon our acceptance by its advocates, we will consider them in order, beginning with the least important.

1. *The existence of rudimentary organs in certain plants and animals.* Rudimentary organs are not of very common occurrence, and so their existence cannot furnish a very important factor in the determination of such a question as that before us. I will give you the argument on this point in Darwin's own words. "I believe that disuse has been the main agency" in the production of rudi-

mentary organs, "that it has led in successive generations, to the gradual reduction of various organs, until they have become rudimentary,—as in the case of the eyes of animals inhabiting dark caverns, and the wings of birds inhabiting oceanic islands, which have seldom been forced by beasts of prey to take flight, and have ultimately lost the power of flying." (*Origin of Species*, pp. 408, 409.)

In reply, I would say, Darwin's explanation of such facts as are cited above, may be the true one, probably is so, but (1) I do not see how, when thus explained they furnish any support to his hypothesis of evolution,—the cases as he states them are cases of degeneration, and not of evolution,—and (2) The variations here cited, are not variations, originating new species, but simply new varieties of an old species,—for surely, no naturalist would account the blind perch found in the waters within the Mammoth Cave in Kentucky, anything else than a perch; differing from the perch which inhabit adjacent rivers, in nothing but the rudimentary character of its eyes. It is a variety of the species perch which has been originated by a variation in its "environments;" and so, its existence can furnish no support for a hypothesis, intended to account for "the origin of Species."

2. *The facts of embryology* are cited by Darwin in support of his hypothesis. All the variations with which the study of embryology has made us acquainted, are variations of growth-development, and as we have already seen, belong to a system of revolution, and not evolution; they are parts of a series which runs a certain round, returning ever to the same starting point again; they belong to the history of an individual life, and are repeated only as that life is repeated. In the case of the silk-worm moth, it is first an egg, then a caterpillar, then a chrysalis and lastly, a winged insect; and just such as it is to-day, it was 6000 years ago in the garden of Eden; and although it has passed through this whole series of changes 6000 times, it has made no upward progress in its form and structure; there has been in its growth-variations no evolution into a creature of a higher order.

The variations in growth development, exhibit, it is true, possibilities of change in animal structure; but that is all that can be claimed for them. DeQuartrefages well says—"When we get upon the ground of possibility, I know not where we shall stop. Every thing is possible except that which implies contradiction. Consequently we are no longer on the ground of science, which demands positive, precise facts. We are living in the land of romance." (*Natural History of Man*, p. 82.

3. *The geographical distribution of plants and animals* is appealed to by evolutionists; especially the fact that certain species are to be found in certain countries only, e. g. the Kangaroo in Australia, and the Sloth in South America;—and it is said, if we sup-

pose them to be the product of evolution, we can readily understand how, having been evolved in the countries in which they are found, they have not yet spread to other parts of the earth.

To this, I reply,—true,—but on the hypothesis of creation, we may suppose them to have once existed in other lands, but to have died out in all except the few in which they now live. The disappearance by death of species of plants and animals from a country is an event of frequent occurrence in the history of our world. The Dodo, an immense bird, and native in the same land, in which alone the Kangaroo is found to day, has died out since the discovery of Australia by Europeans. "Pictet catalogues ninety-eight species of mammals which have inhabited Europe in the Post-glacial period. Of these fifty-seven still exist unchanged, and the remaining forty-one have disappeared." (The Earth and Man, p. 357.)

The distribution of certain species, e. g. the oyster—and the oyster in some of its varieties is to be found on the coast of almost every country within the torrid and temperate zones—is very difficult to account for on the hypothesis of evolution; which traces all the oysters in the world back to an original oyster, evolved from some lower mollusk, at some one point, from which they must have distributed themselves. Darwin writes.—"Turning to geographical distribution, the difficulties encountered on the theory of descent, with modification, are serious enough. All the individuals of the same species, and all the species of the same genus, or even higher group, must have descended from common parents; and therefore, in however distant and isolated parts of the world they may now be found, they must in the course of successive generations have travelled from some one point to all others. We are often wholly unable even to conjecture how this could have been effected." (Origin of Species, p. 414.)

4. *A fourth argument in support of evolution is founded upon the gradual advance in the type of living creatures,* as we learn the history of organic nature from an examination of the fossiliferous rock-strata of the earth,—*and, the satisfactory explanation which it furnishes of the natural groupings of plants and animals,* as set forth in the natural system of classification now universally adopted by botanists and zoologists. On this ground, mainly, Prof. Huxley advocates the hypothesis; and in my judgment, it furnishes the strongest argument which has yet been brought forward in its favor.

Evolution does afford a very simple and a very beautiful explanation of the natural grouping of plants and animals. But the theory of creation by an almighty and intelligent creator, working with a plan, affords, I think, an explanation equally simple, and equally beautiful. Of our system of natural classification Agassiz writes:—"Are our systems the inventions of naturalists, or only their reading of the Book of Nature? And can that book have more than one reading? If these classifications are not mere inventions, if

they are not an attempt to classify for our own convenience the objects we study, then they are the thoughts which. whether we detect them or not, are expressed in Nature,—then nature is the work of thought, the production of intelligence, carried out according to plan. therefore premeditated,—and in our study of natural objects, we are approaching the thoughts of the Creator, reading his conceptions, interpreting a system that is his, and not ours." (Methods of Study in Natural History, pp. 13, 14.) Natural Classification, an expression of the thoughts of God is, to my mind, an idea I cannot willingly give up.

Let us consider an analogous case to that we are studying, in so far as our present condition will furnish us one. Man, an intelligent being, in every age, has constructed for himself some sort of habitation. In the change in his environments which marks his progress in civilization, his habitation has assumed, successfully, the different forms of,—the bark hut, the log cabin, the substantial farm house, the brown-stone city residence, and the marble palace. These all form what may be called a natural group, and beginning with the rudest, constructed in the earliest stage of civilization, they gradually assume a more and more perfect form in harmony with their improved environments;—and, as they are all intended for substantially the same purpose, i e. to furnish man shelter from the sun and storms, they all possess common features,—they all have roof, and sides, and floor, and doors. To a visitant from some other sphere, who knew nothing of man's habits and history, this group of human habitations would present a subject of study not unlke that which a family of fossil mollusks in the rock-strata of the earth presents to us. Will the fact that they present a natural group, and that their advance in structure correspond to their advance in environment, justify this visitant from a distance, in deciding that they must be the product of some kind of evolution?—that the bark hut evolved the log-cabin, and the log-cabin the farm house, and so on. The truth in this case, as known to all denizens of earth. explains all the phenomena equally well. They are all the work of intelligent man, working with a plan. and for a definite purpose; and the very points upon which the evolution theory must rest, are. as we know in this case, simply the evidences of purpose and plan on the part of the intelligent builder.

I have now given you a brief,—but, I think, a fair statement of the arguments, by which Darwin and other Evolutionists support their hypothesis, with my answers thereto. Turn we now to the arguments on the other side,—the objections to this hypothesis.

The objections are such as these, viz.—As we learn the history of our world's progress from the study of its fossiliferous rock-strata,—

1. *Many allied species of plants and animals have come into being cotemporaneously*, and not in succession, as must have been the case if originated by evolution.

2. In the case of certain natural groups, e. g. the group of mollusks inhabiting chambered shells, such as the Nautilus Pompilius of our day,—and this group of mollusks stands at the head of the class of mollusks,—*the higher species appear first, and not the lowest*, as evolution would require. Their history is one of degradation and not advance in the scale of being.

3. *The great number of transition forms, required to connect species with species according to the evolution hypothesis cannot be found.* Darwin accounts for their absence from the kingdom of living organic nature as it surrounds us to-day, by supposing that there has been all along "a struggle for existence, with survival of the fittest" This explanation may be admitted,—but it does not meet the case put; Our question concerns especially the past. If in the struggle for existence innumerable species have perished all along the line from the beginning, and Darwin expressly admits that this must have been true, how comes it, that in the fossiliferous rocks,—that vast burying-ground of the ages,—none of their graves are to be found? Evolution demands a continuous chain, connecting the latest with the earliest forms; whilst the fossiliferous rocks disclose only detached portions of a chain,—if it be a chain,—with innumerable missing links all along the line.

Time will not permit me to go into a more particular statement of these objections,—and I care the less for this, as in addition to these, there are two capital objections to the evolution hypothesis, in any and all its forms, either of which should, I think, settle the question, as a question between it and the theory of creation.

I. *In nature—outside the disturbing agency of intelligent man—there is no tendency to permanent change manifested by plants and animals*, no tendency to advance in structure; but on the contrary, a manifest tendency to preserve the *status quo* of their beginning. Variations, undoubtedly, do sometimes occur in plants and animals in a wild state, or state of nature; but when they do occur, the law of "reversion to type" comes in, and soon wipes them out again. In proof of this I refer you to the well known facts, that—

1. The highly improved varieties of animals,—and the same is true of plants,—can be maintained only by the greatest care, on the part of the stock-breeder. Let him turn out the finest Jersey cow in all his herd, to run wild on the praries, and mingle with the wild stock there, and she will either die without issue, or her decendants will degenerate from generation to generation, until they become undistinguishable from the wild stock around them.

2. In the ancient paintings and sculptures of Egypt, and Assyria, we have depicted many plants and animals, as they existed three or four thousand years ago; and by comparing there representations with the same plants and animals as they exist to-day, we learn that there has been no change in all this time. This Darwin himself acknowledges. [*See Origin of Species, p.* 125.] Agassiz, a few years

ago, made an examination of the Florida reefs, and from data satisfactory to himself, determined the age of the inner reef to be 70,000 years. After carefully comparing the form and structure of the coral polyps at work there to day. with those that must have built the oldest reef, he writes,—"In these 70,000 years has there been any change in the corals living in the Gulf of Mexico? I answer most emphatically, *No.* Astreans, Porites, Meandrinas, and Madrepores were represented by exactly the same species 70,000 years ago, as they are now." [*Method of Study in Natural History, p.* 190.] Prin. Dawson gives us the results of his observations on this point, in the case of certain mollusks in these words,—"I have for many years occupied a little of my leisure, in collecting the numerous species of mollusks, and other marine animals existing in a subfossil state in the post-pliocene clays of Canada, and comparing them with their modern successors. I do not know how long these animals have lived, Some of them, certainly, go far back into the Tertiary; and recent computation would place even the Glacial age, at a distance from us of more than a thousand centuries. Yet, after careful studying about two hundred species, and, of some of them, many hundreds of specimens, I have arrived at the conclusion, that they are absolutely unchanged." [*The Earth and Man, pp.* 358, 359.]

By "*Natural Selection with survival of the fittest*" Darwin must mean, a natural agency, which in the wild condition of plants and animals, and without any guidance of intelligence. shall accomplish the same results, which are accomplished by what he calls "Artificial Selection," under the guidance of man,—the agency, whatever may be its nature, by which man has secured our improved varieties of plants and animals. His hypothesis of evolution demands this. Now,—in view of the facts stated above, we say, Natural Selection has no existence. It is a creature of Darwin's imagination.

Prof. Huxley virtually admits this. "There is no fault"—writes he—"to be found with Mr. Darwin's method, then; but it is another question, whether he has fulfilled all the conditions imposed by that method, Is it satisfactorily proved, in fact, that species may be originated by selection? *that there is such a thing as natural selection?* that none of the phenomena are inconsistent with the origin of species in this way? If these questions can be answered in the affirmative, Mr. Darwin's views step out of the rank of hypothesis, into those of proved theories; but, so long as the evidence at present adduced falls short of enforcing that affirmation, so long to our mind, must the new doctrine be content to remain among the former—an extremely valuable, and in the highest degree probable, doctrine, indeed the only extant hypothesis which is worth anything in a scientific point of view; but still a hypothesis, and not yet the theory of species." [*Lay Sermons, p.p.* 294,295]

In explanation of Huxley's remark quoted above, that evolution

is—"the only extant hypothesis which is worth anything in a *scientific* point of view,"—I must tell you that, he has already rejected the theory of creation as unscientific, because incapable of verification by direct observation in our day;—a position, involving a very false view of the nature of science, as I think; and certainly untenable by one who confesses himself compelled to admit of creation, or something equivalent thereto, at two points in the history of our world, viz: the origin of matter, and the origin of life.

II. *The law of the permanence of species:*—that however great the variations wrought, under the operation of natural or artificial agencies may be, it never passes the boundary line of species, is irreconcilable with the evolution hypothesis. That hypothesis is, that, each higher type of plant and animal has been evolved from the next below it, and so, demands the passage of the boundary lines, not of one species only, but of all;—and so, the boundary lines of genera, orders, and classes as well,—all that intervene between primordial living things and man.

The proof of the permanence of species, I have already given you; and if we are to proceed upon principles of true science, we must consider that question settled, at least for the present, and treat it as a settled question:—and so treating it, we cannot accept the hypothesis of evolution.

You will naturally ask me—How do Evolutionists reconcile that hypothesis with this law? Darwin attempts a reconcilliation, by supposing that this law has not always obtained,—that far back in ages past, it is possible that a different order of things may have prevailed. On this point, listen to DeQuartrefages,—"In many cases these possibilities are opposed to the facts that transpire in our day, so that the reasoning comes to this: But is it not possible that events took place in former times differently from those which happen to-day? Serious Science, Gentlemen, cannot accept this mode of reasoning. It does not admit changes in the laws which rule this world—in those which touch organic beings any more than in those which concern inorganic bodies." (*Natural History of Man, p.* 82.) And Prin. Dawson writes—"Let the reader take up either of Darwin's great books, or Spencer's Biology, and merely ask himself as he reads each paragraph, what is assumed here. and what is proved? and he will find the whole fabric melt away like a vision." [*The Earth and Man, p.* 330,]

Prof. Huxley, in his article on the Origin of Species, has a beautiful passage to which I will ask your attention. Speaking of growth-development in its earlier stages, he writes—"Examine the recently laid egg of some common animal, such as a salamander or a newt. It is a minute spheroid, in which the best microscope will reveal nothing but a structureless sack, enclosing a glairy fluid, holding granules in suspension." But strange possibilities lie dormant in that semi-fluid globule. Let a moderate supply of warmth

reach its watery cradle, and the plastic matter undergoes changes so rapid, and yet so steady and purposelike in their succession, that one can only compare them to those operated by a skilled modeler upon a formless lump of clay. As with an invisible trowel, the mass is divided and sub-divided into smaller and smaller portions, until it is reduced to an aggregation of granules, not too large to build withal the finest fabrics of the nascent organism. And, then, it is as if a delicate finger traced out the line to be occupied by the spinal column. and moulded the contour of the body; pinching up the head at one end, the tail at the other, and fashioning flank and limb into due salamandrine proportions, in so artistic a way, that, after watching the process hour by hour, one is almost involuntarily possessed by the notion, that some more subtle aid to vision than an achromatic, would show the hidden artist, with his plan before him, striving with skillful manipulation to perfect his work." [Lay Sermons, pp. 260, 261.] This "hidden artist, with his plan before him." is just what the theory of creation brings to our knowledge, working, not only in these variations of growth-developement, but in all the variations of nature as well,—a living Creator, and not a dead, insensate Law.

You have now the whole case before you:—the arguments for and against the two hypotheses of evolution and creation; briefly, but I think, fairly stated. Judging the matter, simply as a question of science, which will you accept,—the old, or the new? For myself I say—having "drunk the old wine, I do not desire the new,—the old is better."

Turning now, very briefly, to the relations of evolution to the Bible and our Christian faith—I remark:—

1. *The Evolution hypothesis when taken in its widest range:*—"which solves the question of human origin by assuming that human nature exists potentially in mere inorganic matter, and that a chain of spontaneous derivation connects incandescent molecules or star-dust with the world, and with man himself;" is, beyond all question, atheistic, and it is adopted and defended by its advocates as an atheistic hypothesis. In this form, evolution is confessedly irreconcilable with the Bible and with our Christian Faith.

2. *Evolution, as held and taught by C. Darwin, beginning with certain primordial living forms, and including man in its range,* by some of its advocates, has been presented as an atheistic hypothesis. Others, including C. Darwin himself, regard evolution simply, as "*a mode of creation,*" and it cannot then be regarded as athesitic. But, in its account of the origin of man, it is irreconcilable with the Bible declarations,..."And God created man in his own image, in the image of God created he him: male and female created he them." [Gen. 1: 27.] and "The LORD God formed man of the dust of the ground, and breathed into his nostrils the breath of life and man became a living soul." [Gen. 2: 7.] and, "The LORD God

caused a deep sleep to fall upon Adam, and he slept; and he took one of his ribs and closed up the flesh instead thereof. And the rib which the LORD God had taken from man he made a woman, and brought her unto the man." [Gen. 2: 21, 22.] Any system of interpretation which will make these statements agree with the evolution of man from an anthopoid ape, must be so exceeding allegorical, as to take away all reality from the accompanying story of the temptation and the fall; and, so, would strike out the doctrine of the federal headship of Adam, and along with this the covenant headship of Christ, cardinal doctrines in our Calvinistic System, from our Christian Faith.

I cannot agree with Darwin as he writes—"When I view all beings not as special creations, but as the lineal descendents of some few beings which lived long before the first bed of the Silurian system was deposited, they seem to me to become ennobled. [*Origin of Species, p.* 436.] It is not the length of our ancestry alone, but the character as well, which ennobles;—and of such a genealogy as that which Darwin has made out for himself, a genealogy which reads—man which was the son of a long-tailed, sharp-eared monkey, which was the son of an Opossum, which was the son of a Lizard, which was the son of a Fish, which was the son of a Sea-Squirt—I cannot but think, that, in so far as nobility is concerned, the more a man has of it, the worse off will he be. My sympathies are altogether with Agassiz—"I confess that there seems to me a repulsive poverty in this material explanation, that is contradicted in the intellectual grandeur of the universe; the resources of Deity cannot be so meagre, that in order to create a human being endowed with reason, he must change a monkey into a man," [*Methods of Study in Nat. Hist. Preface, p.* 4.]

3. *A modified hypothesis of evolution, as it applies to man, has recently been advanced, which attributes the origin of man's body to evolution, but that of his soul to immediate creation.* On the hypothesis in this form, I remark:—

(1.) It is thoroughly unscientific in that it attributes the origin of the body of woman, according to its author's statement of it, to immediate creation. In the view of every naturalist, woman is half the species Homo, is half the man:—and to state the hypothesis in the language of science, it should read—One half the body of man is the product of evolution, the other half, along with his soul, the product of immediate creation. Such a mongrel origin for a living body is without precedent in even the wildest speculations of scientists.

(2.) It is, I think, irreconcilable with the account of man's creation given us in Gen. 2: 7, "And the LORD God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul." The phrase here rendered "a living soul" literally rendered is "an animal of life." Jamieson, in

his comments on this verse, writes—"At its first formation, the body of man, so exquisitely organized, was no more than a mass of inert matter, till the Lord God endowed it with vitality, 'and breathed into his *nostrils the breath of life*'—lit. lives: but though in the plural form, it is commonly rendered, life, the natural or organic life, as the phrase usually denotes—'*and man became a living soul*'—lit, an animal of life [ch. V. 19. Ch. I 20, 24, 30; X, 12, 15, 16, where the words are used in this sense]; and hence Bishop Warburton paraphrases the passage before us in the following manner: 'He breathed into this statue the breath of life, and the lump of clay became a living creature." [*Jamieson's Commentary in loc.*]. Dr. McCosh writes—"There are two accounts of the creation of man, One is in Gen. 1:26. There is council and decision: 'Let us make man in our image.' This applies to his soul or higher nature. The other account is in Gen. 2:7. 'And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul.' This is man's organic body." (*Development. p.* 35.)

What is affirmed in Gen. 2:7, is, [1] That God made the inanimate body of man of the dust of the ground, and then [2] by a special act imparted animal life to that inanimate body. The product of evolution from the very nature of the process,—"descent with modification"—is a living thing; possessed at the least of animal life. It may die very early, but at its beginning it must be a living thing. With this passage before us, we have the alternative:—either—[1] The body God formed was an inanimate body, and to this he imparted life,--which accords well with scripture, but not with the doctrine of evolution,—or, [2] The body God formed was possessed of animal life, to which he afterwards imparted an immortal soul,—which accords with the doctrine of evolution, but is irreconcilable with Scripture.

3. As to the relation of the evolution hypothesis in this form to our Christian Faith, I would say, speaking for myself alone, if I adopted it, the story of the temptation and the fall, as given us in the book of Genesis, would become to me a myth, and as the consequence thereof, I should lose my hold upon some of the fundamental doctrines of christianity.

4. *The hypothesis of Evolution, taking it in its limited range*, as excluding inorganic nature on the one hand, and man on the other; and understanding it simply as *a mode of creation*, cannot be considered atheistic; nor is it utterly irreconcilable with the Bible account of the origin of plants and animals in the world;—though, as I think, it is not as thoroughly in harmony with the Bible account of God's relation to nature as the old theory of creation is, as that relation is set forth in such passages as the following, viz: "In him we live, and move, and have our being." Acts 17:28. "Behold the fowls of the air; for they sow not, neither do they reap, nor gather

into barns; yet your heavenly Father feedeth them." Matt. 6:26. "He giveth to the beast his food, and to the young ravens which cry." Ps. 147:9. The unfavorable reception which it has met at the hands of christian men generally, is owing, if I mistake not, like that of poor Tray in the old fable, not so much to what it is in itself, as to the company in which they found it.

In this last mentioned form it is, that the hypothesis of evolution is held by most of those styled Evolutionists in our day. By some few specialists, whose scientific training has imparted to them no peculiar fitness for deciding upon such a question as this, it is spoken of as an established truth, and as an integrant part of science itself. Not so with Scientists of broader culture. Huxley speaks of it as "still a hypothesis, and not yet the theory of species," and Virchow styles it "an unproved hypothesis." Its popularity is evidently on the wane. But a few weeks ago, it was stated in the public prints, that, the school authorities in Prussia, had prohibited the teaching of it in the public schools. The earlier chapters of its history in our day were bright—but bright with a delusive promise;—and I will venture the prediction, that the last chapter,—and some of you will live to read it,—will be a record of what Huxley calls,—the oft-repeated tragedy of science, the slaughter of a beautiful theory by ugly facts.